ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5140

Research on clarification of Alaska pollack resources in the Bering Sea and waters around the Kamchatka Peninsula

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Original title: Beringu kai oyobi kamchatsuka hanto shuhen kaiiki no suketodara shigen no keitogun no kaimei ni kansuru kenkyu

In: Office of Agriculture, Forestry and Fisheries Research Council, Chapter 3, p. 89-119, 1979

Original language: Japanese

Available from:

Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1985

39 typescript pages

Fisheries & Oceans
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Pêches & Océans

90-00950/

Trans. 5140

DEPARTMENT OF THE SECRETARY OF STATE
TRANSLATION BUREAU

MULTILINGUAL SERVICES DIVISION

SECRÉTARIAT D'ÉTAT
BUREAU DES TRADUCTIONS

DIVISION DES SERVICES MULTILINGUES

TRANSLATED FROM – TRADUCTION DE	INTO – EN
Japanese	English

AUTHOR – AUTEUR

YOSHIDA Haruhisa

TITLE IN ENGLISH – TITRE ANGLAIS

Research on clarification of Alaska pollack resources in the Bering Sea and waters around the Kamchatka Peninsula.

TITLE IN FOREIGN LANGUAGE (TRANSLITERATE FOREIGN CHARACTERS)
TITRE EN LANGUE ÉTRANGÈRE (TRANSCRIRE EN CARACTÈRES ROMAINS)

Beringu kai oyobi kamuchatsuka hantō shūhen kaiiki no suketōdara shigen no keitōgun no kaimei ni kansuru kenkyū.

REFERENCE IN FOREIGN LANGUAGE (NAME OF BOOK OR PUBLICATION) IN FULL. TRANSLITERATE FOREIGN CHARACTERS.
RÉFÉRENCE EN LANGUE ÉTRANGÈRE (NOM DU LIVRE OU PUBLICATION), AU COMPLET, TRANSCRIRE EN CARACTÈRES ROMAINS.

REFERENCE IN ENGLISH – RÉFÉRENCE EN ANGLAIS

PUBLISHER – ÉDITEUR	DATE OF PUBLICATION / DATE DE PUBLICATION			PAGE NUMBERS IN ORIGINAL / NUMÉROS DES PAGES DANS L'ORIGINAL
Office of Agriculture, Forestry and Fisheries Research Council	YEAR / ANNÉE	VOLUME	ISSUE NO. / NUMÉRO	89-119
PLACE OF PUBLICATION / LIEU DE PUBLICATION	1979			NUMBER OF TYPED PAGES / NOMBRE DE PAGES DACTYLOGRAPHIÉES: 39

REQUESTING DEPARTMENT / MINISTÈRE-CLIENT: Fisheries & Oceans

BRANCH OR DIVISION / DIRECTION OU DIVISION: Resource Services

PERSON REQUESTING / DEMANDÉ PAR: Mark Saunders

YOUR NUMBER / VOTRE DOSSIER N°:

DATE OF REQUEST / DATE DE LA DEMANDE: 29-12-81

TRANSLATION BUREAU NO. / NOTRE DOSSIER N°: 476513

TRANSLATOR (INITIALS) / TRADUCTEUR (INITIALES): SH / PS

APR 16 1982

SOS-200-10-8 (REV. 2/68)
7930-21-029-8333

Secretary of State | Secrétariat d'État

MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU | BUREAU DES TRADUCTIONS

Client's No. – N° du client	Department – Ministère	Division/Branch – Division/Direction	City – Ville
	Fisheries & Oceans	Resource Services	Nanaimo, B.C.
Bureau No. – N° du bureau	**Language – Langue**	**Translator (Initials) – Traducteur (initiales)**	
476513	Japanese	SH / PS	APR 1 0 1982

RESEARCH ON CLARIFICATION OF ALASKA POLLACK (Chalcogramma Theragra) RESOURCES IN THE BERING SEA AND WATERS AROUND THE KAMCHATKA PENINSULA

Report on results

September 1979

Office of Agriculture, Forestry and Fisheries Research Council

Chapter 3

Tagging-releasing

Alaska pollack has an exceedingly wide distribution among bottom fishes. Spatially, as well, it appears that it makes its home in surface, middle and bottom layers and that its population movement range is wide. Therefore, successful tagging-releasing experiment will most likely enhance greatly the development of the present research. Consequently, this chapter was included in this research, with the chief aim of investigating technically its various difficult aspects by experimenting with tagging and releasing in available waters. p. 91

As will be stated in the text, recapture rates increased every year, showing bright prospects in tagging-releasing experiments with this species. In addition, valuable information was obtained on phylogenetic group structure through movement examples of released fish. Here, focussing on this research, are presented collectively investigations on tagging-releasing which were carried out between 1966 and 1978.

1. Magnetic tagging

In Europe and North America, substantial results have been obtained by tagging with a small piece of metal on shrimp, herring, mackerel, salmon, and trout, which were released and recovered using metal detectors during catches and salmon and trout runs. Problems in the utilization of this method with Alaska pollack were investigated.

(1) Materials and size

A small piece of tinplate and Permayllo equivalent in size to the flag part of anchor tag commonly used with fish is detectable by a metal detector in laboratory and fish processing factories at output voltages shown in Table 3-1. Since outputs over 100 mV are completely detectable, the

Table 3-1 Test data on magnetic tag samples

No	Materials	Shape	Weight	Voltage			Remarks
				Length-wise	90°	Diagonal	
1	Tin	3x7x0.3 mm	0.0 g	900 mV	330 mV	300 mV	Frequency
2	"	"	"	850	320	280	15 mHz
3	Permayllo	3x7x0.35	0.10	750	320	280	Sensitivity
4	"	"	"	650	280	250	S = 7
							Noise level 7 mV

1 & 3 = Laboratory tests

2 & 4 = Wakkanai Fish Factory tests

Average values of 100 measurements each.

detection ability was thorough. Although differences in detection ability were observed in directions opposite the detection surfaces of the material (the surface where detection line of magnetic force runs), it is not a significant problem even at the lowest detection ability. Differences between laboratory and factory were due to an admixture of salted fish in testing. Stainless steel and aluminium were also tried as materials.

However, detection ability dropped significantly with these. Soft iron, which is the cheapest and most easily obtainable, had the highest detection ability. The metal detector, a commercial detector, was adapted so that sensitivity, noise levels, frequencies and detection surface areas could be varied. Several gauges were also attached. Between July 1972 and March 1973 this detector was employed in actual test conditions at a fish processing factory in Wakkanai. In addition to the test, it was also used to detect foreign substances. During this period foreign substances were detected 5 times: nails, twice; hairpin, once; staples, twice. There was only one occasion when the foreign substance was not detected.

In making a magnetic tag, a small piece of tin inlayed in the flag portion of an anchor tag or in an identification tag is suitable, but it is easiest to imbed a wire in the thread portion or in a plastic tube. Even in this case, detection ability does not decrease no matter what the direction of the small piece is. It was discovered that wire only 1 cm long and as thin as a parcel tag tie was completely detectable. p. 92

(2) State of usage of metal detectors

Based on a survey taken at the end of 1972, metal detectors have been introduced on all mother ships, most factory ship-trawlers and a majority of large-scale onshore factories. They are used to prevent foreign objects from entering into products (Table 3-2). They are utilized in the final stage of ground fish production, instead of at the whole fish stage which would be suitable for the discovery of tagged fish. Since our aim was to discover tagged fish, it was necessary to utilize metal detectors at both the whole fish stage and the finished product stage.

Tests could not be carried out on board ship. It is thought that the vibration and the steel surroundings were factors which sharply reduced detection ability. The metal detector manufacturer uses a 4 mm iron ball as the standard for 100 % detection. If the wire is completely implanted in the plastic tube of the identification tag that is used ordinarily with fish, positive detection is probable even on board ship.

(3) Practical problems

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Since Alaska pollack is used as food, even the possibility of pieces of metal remaining in the finished product is out of the question. If conditions were such that all fish caught underwent metal detection, practical magnetic tagging would become a reality. If that were so, discovery of tags could be done mechanically, without depending on human eyes; one could also select suitable tags and tagging methods. At present, metal detectors have not been adopted by most small-scale factories, so we are not yet at the stage where methodical detection can be put into practice.

2. Discovery and reporting of tags implanted onshore

Between 25 May and 4 June 1970, 208 fish were tagged by the Hokkaido Prefectural Abashiri Fishery Research Station when the catch was brought unto the wharf at Kombetsu Harbour; on 23 June of the same year 86 fish from the catch were tagged by Hokkaido Prefectural Wakkanai Fishery Research Station on the wharf in Wakkanai Harbour. These fish were mixed in with the general fish catch, and thereafter a follow-up investigation was conducted.[1] The earliest report was the following day, the last was 20 days later. Total reported numbers were: 21 fish at Kombetsu (10.1 %), and 20 fish at Wakkanai (23.3 %). Table 3-3 shows reported numbers according to destination of fish.

The entire catch at Wakkanai, including tagged fish, was sent to a ground-fish factory; detections were at the boning factory where fish heads and viscera are separated. At Kombetsu, fish went to several destinations. No reports came from locations to which fish had been transported in drums for use as bait for zuwaigani crabs (Chionoecetes Opilio). From the ground fish factory 2 fish [detections] were reported. From the fish fillet factory where manual processing is most intensive, 19 fish were reported. Correspondingly, detection and reporting by factories was very irregular as can be seen from Table 3-3. From this it was understood that factors such as knowledge about tagging and releasing, as well as degree of illumination in factories and so forth all have an influence [on detection].

The Pelagic Fisheries Laboratory Station during July and August of 1972 carried out an experiment on tagging fish catches on the Daini Nisshinmaru, a ground fish-meal factory ship. The method used consisted of tagging 15-20 fish when, in the morning, the first net full of fish was hauled onto the factory ship's deck; then, when during fishing operations the second net was hauled on deck the tagged fish were buried under a mountain of [un-tagged] fish. As shown in Table 3-4, detection and reporting was 4% in total. p. 94

Celluloid disks 12 mm in diameter were used for tags. White tags and half-circle white/half-circle red painted tags were both used. Since specimens were few, it is difficult to be sure, yet, it appears that red and white painted tags were more easily detected. On the factory ship tags possibly fell off or sank into the fishes' flesh when they were going through the fish selector and washer. Although it had been anticipated that detection would be best at the headcutter where fish are lined up one by one manually, it appears that since speed is required in this operation, often

when the tag was noticed the fish had already been swallowed into the head-cutter. After this stage, possibility of tags being detected was almost nil because fish went into the fish-meal material collecting tank.

As can be seen above, tag recovery in catches---10% at Nombetsu, 23% at Wakkanai and 4% on the factory ship---is very low.

3. Tag types and live-fish catch-method

Between 1970 and 1972 Hokkaido Prefectural Abashiri, Wakkanai, and Kushiro Fisheries Research Stations carried out tagging and releasing using various tags, and investigated recovery rates. Table 3-5 summarizes the live fish catch methods and the release and recapture numbers for each kind of tag. Compared to recapture rates from trawlnet caught fish, rates of those caught by <u>haikara</u>* fishing were considerably higher evidencing the significant role that the vitality of [tagged] fish has. As reported below, fish caught by trawlnets and haikara fishing were tagged at the Hokkaido Fisheries Research Station. However, from fish caught by trawling, only 1 fish in several thousand was recaptured, which is so little as to be insignificant compared to haikara-caught fish recovery.

When recovery rates by different tags are considered in the case of trawlnets (shown in Table 3-5), there was little difference between anchor tags affixed with a tag-gun and spine tags; tags using plastic tubes and anchor tags combined with round identification tags had clearly higher recovery rates. While these increase the burden on the fish, they are much easier

* Translator's note: A traditional Japanese fishing method used primarily in mackerel fishing. Several weighted main lines are suspended vertically from rings over the side of a ship. On each line are attached several branch lines to which hooks and bait (artificial) are attached. Also called <u>tachinawa-tsuri</u> (standing-line fishing).

to detect. Considered together with onshore tagging-releasing test results of the previous section, it can be seen that the ease of detection is quite significant.

Figure 3-1 shows tags and tagging locations used by the Pelagic Fisheries Research Laboratory in the eastern Bering Sea. Those used by other organizations are basically the same. While the Pelagic Fisheries Research Laboratory used nickel wire to attach round tags, both the Hokkaido Fisheries Laboratory and Hokkaido Fisheries Research Station used plastic tubes or spine tag plastic line. With the anchor tag as well, about the only difference with those used by Hokkaido F. L. and Hokkaido F.R.S. is a small flag attached to the top. The affixing location used by all organizations was the base of the first dorsal fin. With other fish, tags are sometimes attached to gills or the caudal peduncle, but these locations are thought to be unsuitable for weak Alaska pollack. Although 6 to 16 mm diameter round tags were used, we ended up using mainly 15, 16 mm tags since larger ones were easier to detect. p. 95

4. Past results with tagging-releasing p. 96

The main tag releasing tests in the past are listed in Table 3-6; of particular note is the test carried out before the war on the east coast of Korea where 12 fish were recovered on the west coast of Hokkaido. In addition there is the report (Tanaka, 1970[4]) of a similar experiment where fishing grounds were differentiated in long line fishing by using different coloured rubber bands to attach the squid-cut bait to the hooks; the degree of interchange between fishing grounds in Japan Sea was inferred from the colour composition of the rubber bands recovered at the fish processing plant.

5. Materials for releasing and recapture

Materials on tagging-releasing and recapture carried out between 1906–1978 were assembled for this study. In figure 3-2 are shown the sea districts and demarcations used; figure 3-3 shows demarcations of sub-sea districts around Hokkaido.

While most recaptured fish were obtained in the vicinity of their release, figure 3-4 shows examples of recovery in distant sea districts. For example, among the 432 fish recovered from among those released on the Okhotsk shore of hokkaido, 7 fish were recaptured in the vicinity of the Kamchatka Peninsula. Among those released off Govena cape and northern shore of Sakhalin, however, only 2 or 3 of those released which had travelled considerable distance were recovered as illustrated in the figure. Since in both those release locations fishing is not pursued, it is only natural that there was not any recapture in those vicinities. When considering the recovery process, the above circumstances must be taken into consideration.

(1) Eastern Bering Sea

The Pelagic Fisheries Research Laboratory's tagging-releasing operations in the eastern Bering Sea between 1966 and 1971 reached a total of 12,762 fish. Details are shown in Table 3-7. As illustrated in Table 3-8, among these, 7 fish were recovered. With regard to some 1837 fish released, six were found back among fish taken with fishing rods (0.33 %); of other 10.925 fish released, one was recovered among fish taken by a side trawler.

This poor recovery-reporting rate is thought to be due to the large scale mechanization and large amounts of fish being processed as discussed in Section 2. Among those released during the summer of 1969 north of

the Pribilof Islands, some were recaptured farther north one month later; six months later in winter some were recaptured west of the Pribilof Islands; and 9 months later during the spawning season some were recaptured in the spawning grounds near the Unimak Pass. In addition, during the feeding season two years later some were also recaptured west of the Pribilof Islands. And in the summer of 1971, some of the fish released east of the Pribilof Islands were recaptured about 1 month later west of the islands. Of the fish released during the same summer on the northern side of the tip of the Alaskan peninsula, two were recaptured about 9 months later during the spawning season in the spawning grounds on the north side of Unimak Pass. p. 97

(2) Vicinity of Kamchatka Peninsula

Between 1970-1976, 10,682 fish were released by Hokkaido Fisheries Research Laboratory around the southern part of Kamchatka Peninsula: 4,633 fish off the east coast and 6,049 off the west coast. Data on those releases are given in Table 3-9, and an outline is presented in Figure 3-5. Fish were captured by trawler (3,967 fish), by special

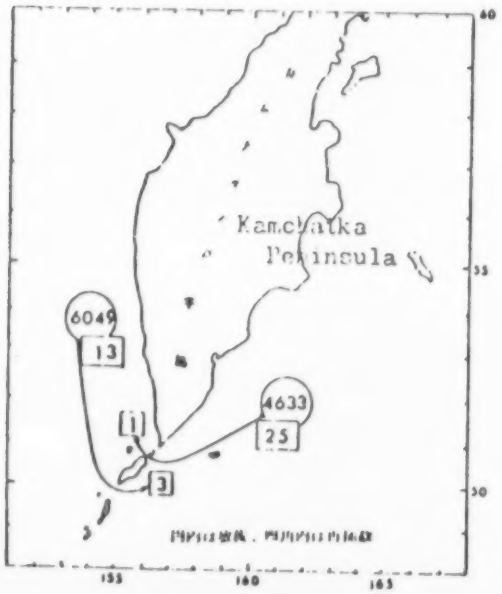

Figure 3-5

Tag/release & recovery near Kamchatka Peninsula-1971-1976.

Numbers released in circles.

Numbers recovered in boxes.

trawler in which a bamboo basket was inserted into the cod-end to lessen the pressure on fish (2,856 fish), and by fishing line (2,859 fish); recovery from each of the different methods was 1, 0, and 41 fish respectively. Anchor tags were used for part of the tagging in 1972, but most tagging was done by attaching (sewing on) 15 mm diameter red disks with white plastic tubing. No fish tagged with anchor tags were recovered.

Of the 42 fish recovered off the east and west coasts of Kamchatka (Figure 3-5) 38 were recovered in the same waters where they were released; only 4 fish had entered into other waters. In addition, among fish released in waters off the Okhotsk Sea coast of Hokkaido and the north coast of Sakhalin Island, 9 were recovered. None of the fish released in these waters were recovered in other waters. These facts constitute an important basis in assuming a phylogenetic grouping structure for these waters.

In the northern Bering Sea 4,286 fish were released with 7 being recovered; in the northern Okhotsk Sea 1,250 fish were released with 3 being recovered (Table 3-9). Among fish recaptured, 5 had travelled long distances. The small numbers of recapture have to be taken into consideration.

(3) Okhotsk Sea and Japan Sea Coasts of Hokkaido

Abashiri and Wakkanai Fisheries Research Stations reported releasing 33,340 fish off the Okhotsk Sea coast of Hokkaido between 1970 and 1976; of these 280 were recaptured. The majority of those used were caught with a kakemawashi* drag net. A summary is presented in Table

* Translator's note: Exact equivalent not found, but word means 'swishing around'.

3-10. Hokkaido Fisheries Research Laboratory also released 3,170 fish with a recapture of 185 fish. The release record is given in Table 3-11; the recapture record in Table 3-12. Of the fish used 13 were caught by trawl, 346 by special trawl, and 2,811 by hand lines. Only fish initially caught on hand lines were recaptured.

On the Japan Sea coast of Hokkaido hand lines could not be used because spawning fish did not take to the bait and because after the spawning season the fish disperse making tagging-releasing difficult. But in 1978 a promising feeding ground was found and of 595 fish released 5 were recaptured.

Figure 3-6 is a summary of releasing and recapture records from 1970-1978 compiled from Abashiri and Wakkanai Fisheries Research Stations and Hokkaido Fisheries Research Laboratory experiments records. While most recoveries were effected in waters of release, a certain number were recaptured in various other waters.

It is thought that these results, which alter theories held up to now, make it necessary to consider that fish off the Hokkaido Okhotsk Sea coast and those off the east coast of Sakhalin belong to the same phylogenetic group structure.

(4) Pacific Ocean Coast of Hokkaido p. 109

In 1973, 162 fish were released off the Pacific coast of Hokkaido, with one fish being recovered near the point of release. From 1977 on, the Hokkaido Fisheries Research Laboratory undertook a full-scale experiment, releasing 3,321 fish, with 98 being recovered. Release data are given in Table 3-11, recapture data in Table 3-12, and a summary in Figure 3-7. Smaller subdivisions of the sea are as in Figure 3-3.

When these sea districts were divided into Sanriku offing, west of Erimo, Hiroo offing, Bōtō and Shikotan offings, it was clear that there was a frequent interchange between each of them. These show a mixing modality during the feeding season, and a probable high degree of return to respective spawning grounds during the spawning season. Amounts of fish caught in these sea areas are greatest during the feeding seasons, which leads us to think that there is a need to consider centralization (unification) as far as resources for the fishing industry are concerned.

6. Summary

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Data from tagging-releasing-recapture not only serve to explain phylogenetic groupings, but is also useful in estimating such things as seasonal movements of fish, growth, catches, or natural death rates. With this in mind, the Hokkaido Fisheries Research Laboratory developed during the course of this experiment a programme that computer-analysed, assembled and stored on magnetic tape data on releasing and recapture. Using that programme Table 3-12 was produced by computer from release-recapture data of fish released by the Hokkaido Fisheries Research Laboratory. While the original tapes include rather detailed measurement records of fish recaptured, and various information relating to [their] discovery, here only the season, location and body length are given.

As for intervals between release and recapture, most by far were short, under one year. But 4 fish were retaken after 1,000 days, with the longest interval being 1,383 days. Durability of tags and tagged fish proved to be satisfactory.

Comparing body lengths between time of release and time of recapture,

many recaptured within one year were shorter at time of recapture. We were able to substantiate this through [direct] comparison of body lengths of the dead fish.

In Table 3-12 there are some cases where recaptured location is unknown. These tagged fish were discovered in the factory. As it happens that factory obtains it fish from several fishing grounds, this is difficult to avoid.

Together with our entry in 1976 into the age of 200 nautical mile limits, our sense of values concerning fish has changed, with a significantly heightened cooperative sense vis-à vis [fisheries] research. We feel that this is the principal reason for the recent improvement in the recapture rate. Given this, it appears that we are now able to estimate catches and natural death rates using recapture rates as a basis. Consequently, the scale of releasing must be pushed to its limits. And at the same time, since Soviet and Korean fishing vessels use the same fish as well, it is hoped that they too will discover and report recaptured fish to the same degree as Japan.

(Yoshida Hisaharu)

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2) Ibid. Part 7. 29 (1), 1972.

3) Ibid. Part 8. 30 (1), 1973.

4) TANAKA Tomishige: Hokubu nihonkaiiki ni okeru suketōdara no gyogyō

Reference (continued)

Sokutsugakuteki kenkyū (Biological Research on Alaska Pollack Fishery in northern Japan Sea), Hokusuishi (Hokkaidō Fisheries Research Station Report) No. 12, 1970.

Utilization of metal detectors in factory ships

Ship name	Fishing company	Manufacturer & address	Model name	Detection ability (min.)
Zuiyōmaru	Taiyō Fishery Co. Northern Trawling Dept.	Does not necessarily use metal detectors, but when meal is being transported from the dryer by a pneumatic system, nuts, bolts, etc. are separated.		
Tenyōmaru	"			
Shōyōmaru	"			
Nisshinmaru No.2	Taiyō Fishery Co. Northern Sea Dept.	Nisshin Electronic Ind. 5 Akefune-cho, Shiba-Nishikubo, Minato-ku, Tokyō.	E MS-10N Electromagnetic Metal Detector	While detection signals were emitted during use, often visual detection was difficult (because of small size)
Sōyōmaru	"	"	"	
Daishinmaru No.12	Kyokuyō Co.	Tsurumi Chem. Ind. Co. 1079 Kami Ikegami-chō Ōtaku, Tokyō	Magnetic Separator	
Daishinmaru No. 22	"	"	"	
Ōtorimaru	Otori Fishery Co.	"	"	
Kinkōmaru	Nippon Suisan Kaisha Trawling Section	Densoku Ind. Co. 8-10 Ginza Chuō-ku, Tokyō.	D-500 Mixed metals detector	Iron...0.8mm sphere Stainless steel ... 2.5 mm sphere
Yamatomaru	"	"	"	"
Harumamaru	"	"	"	"
Fujimaru	"	"		
Niitakamaru	"	None		
Asomaru	"			
Takachihomaru	Hōkoku Marine Prod. Co.	Tsurumi Chem. Ind. Co. 1079 Kami Ikegami-chō, Ōtaku, Tokyō.	Not used before transporting to meal plant. Metal detection done after made into meal.	
Rikuzen maru	"			
Shikishimamaru	Nippon Suisan Kaisha, Northern Sea Dept.	Nisshin Electronic Ind.	Electric Mixed Metals Detector	Able to detect up to metal powder*
Gyokueimaru				
Mineshimamaru	"	None		
Kashimamaru	"			

As of end of 1972

Table 3-3

Recapture conditions of fish tagged on shore

Harbour	Date	Tagging location	Nb. of fish tagged	Handling	Destination	Nb. of reports	Lapsed time	Treatment	Rpt. %	Remarks
Monbetsu	May 25 '70	On ship	21	Boxed	Cold storage	0		Bait, frozen		1.5 cr yellow anchor tag
	May 27 '70	"	19	"	"	0		"		
	May 30 '70	Wharf	16	"	Factory	10	2-6 days	Filet	62.5%	
	May 31 '70	"	11	"	Cold storage	0		Bait, frozen		
	Jun 1 '70	"	8	"	"	0		"		
	"	"	35	"	Factory	5	1-2 days	Filet	14.3%	
	"	"	5	"	"	0		Fish paste		
	"	"	16	Bulk	"	0		Filet		
	Jun 2 '70	"	15	Boxed	"	1	20 days	"	6.7%	
	"	"	22	"	"	2	1 day	Ground fish meat	9.1%	
	Jun 4 '70	"	16	Bulk	"	0		Filet		
	"	"	24	"	"	3	1 day	"	12.5%	
Total			208			21			10.1%	
Wakkanai	Jun 23'70	Wharf	30	Bulk	Factory	6		Ground fish meat	20.0%	5 cm red anchor tag
	"	"	6	"	"	1		"	16.7%	
	"	"	20	"	"	8		"	40.0%	
	"	"	10	"	"	0	1-2 days	"		
	"	"	10	"	"	0		"		
	"	"	10	"	"	5		"	50.0%	
Total			86			20			23.3%	
Grand total			294			41			13.9%	

Table 3-4

Recovery conditions of fish tagged on mother ship (1972)

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Date	Tag type	Fish tagged	No. and location of fish detected
Aug. 16	White tag	15	1 (On deck)
Aug. 17	White tag	20	None
(Sub total)		35	1 (Detection rate : 2.86%)
Aug. 18	Red, white tag	20	2 (On deck; just before headcutter)
Aug. 19	Red, white tag	20	None
(Subtotal)		40	2 (Detection rate:5.00 %)
Total		75	3 (Aver. Detection rate: 4.00%)

Figure 3-1

Tags and tagging positions (Pelagic Fisheries Research Station)

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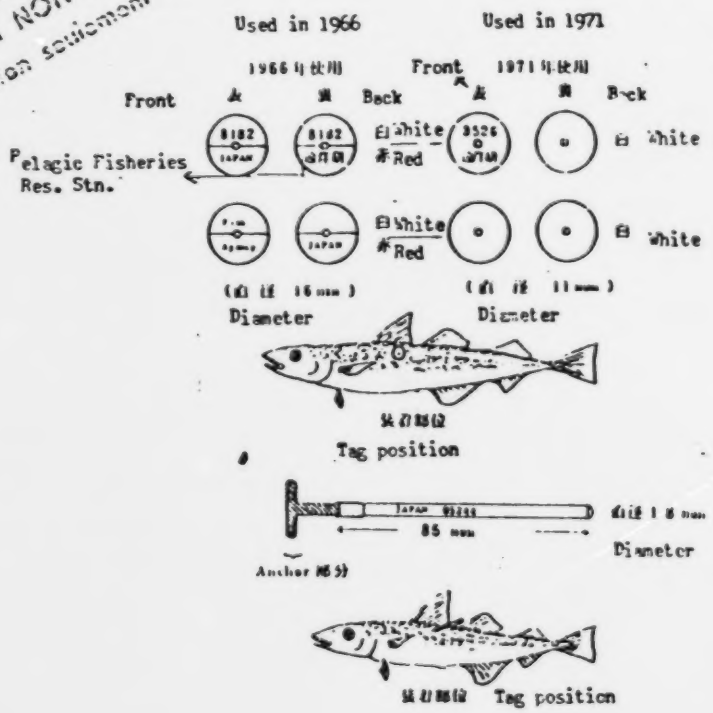

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Table 3-5

Alaska pollack tagged and released in the southwest sea district of the Sea of Okhotsk
Number released by tag type and their recovery

Yr. of release	Release: Sea district	Release: Period	Tag: Equip.	Tag: Type	Length 1)	Nb. released	Nb. recovered	Recovery rate (%)
1970	Kitami offing	May-June	Trawl	Tag-gun	15 mm	1,026	11	1.1
			Trawl	Tag-gun	60 mm	4,934	2	0.04
	Total					5,960	13	
1971	Kitami offing	April-June	Trawl	Tag-gun	15 mm	1,144	11	1.0
			Trawl	Tag-gun	60 mm	2,894	8	0.3
			Trawl	Plastic tube		488	6	1.2
			Trawl	Back bone	140 mm	1,806	17	0.9
			Haikara*	Back bone	140 mm	194	14	7.2
	Nemuro Straits	April	Haikara*	Tag-gun	60 mm	769	4	0.5
	Total					7,295	60	
1972	Kitami offing	Jan-June	Trawl	Tag-gun (Disc)	15 mm	463	3	0.6
			Trawl	Tag-gun (Disc)	60 mm	975	47	4.8
			Trawl	Back bone		5,358	30	0.6
	Nemuro Straits	May	Haikara*	Tag-gun (Disc)	60 mm	173	3	1.7
	Total					6,969	83	
Kitami offing (1970-1972)						19,282	149	
Nemuro Straits (1971-1972)						942	7	
Total						20,224	156	

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1) Space between tag surface and anchor.

Hokkaido Pref. Abashiri, Wakkanai, Kushiro Fisheries Research Stations

* Translator's note: For explanation of haikara, see translator's note on page 6.

Table 3-6

Past Alaska pollack tag/releasing experiments

Year released	Sea district	Nb. of fish released	Recovery (%)	Organization
1931	Rishiri Is., Kutsugata Offing	3,400	2 (0.06)	Hokkaido Fisheries Research Stn.
1932-36	East coast of Korea	23,400	235 (1.00)	Government-General of Korea, Fisheries Research Stn.
1951	Hokkaido. Pacific Coast	487	2 (0.41)	Hokkaido Fishery Laboratory, Hokkaido Fishery Res. Stn.
1951	Hokkaido. Japan Sea Coast	225	0 (0.00)	Hokkaido Fishery Laboratory, Hokkaido Fishery Res. Stn.
1956-57	Seas off Niigata & Ishikawa Prefs.	7,120[1]	205 (2.88)[1]	Nihon Fishery Laboratory
1964	Iwauchi offing	172	11 (6.39)	Hokkaido Central Fishery Res. Stn. & Hokkaido Fishery Lab.
1968	Ishikari Bay	666	17 (2.55)[2]	Hokkaido Central Fishery Res. Stn.

1) Estimated numbers released & estimated recovery rate, due to long line fishing.

2) As of 31 Jan. 1970.

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Figure 3-2

Sea districts and divisions used in tag/releasing

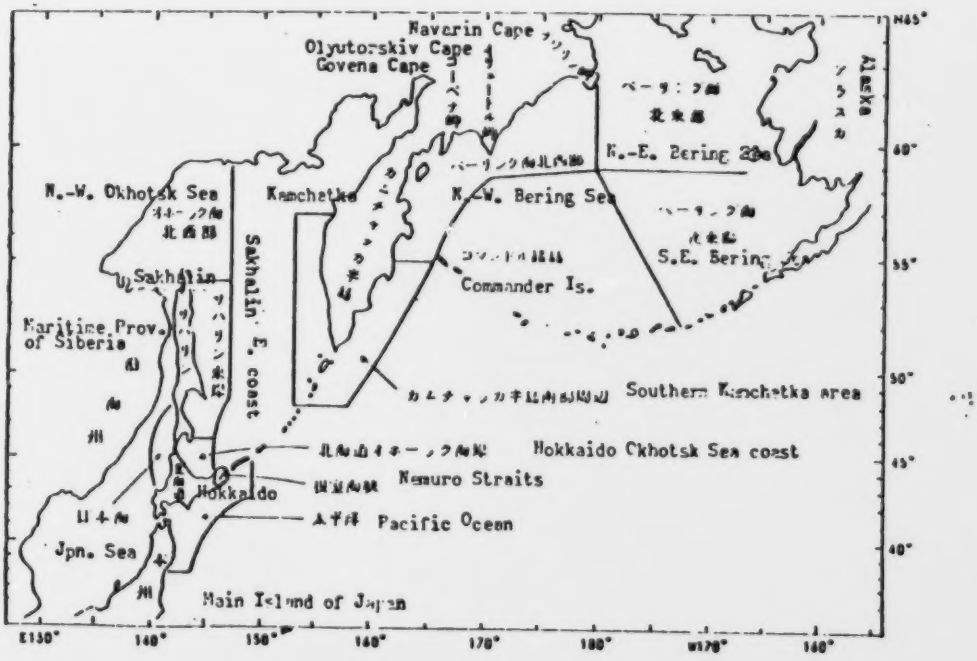

Fig. 3-3

Small sea district divisions for tag recovery records

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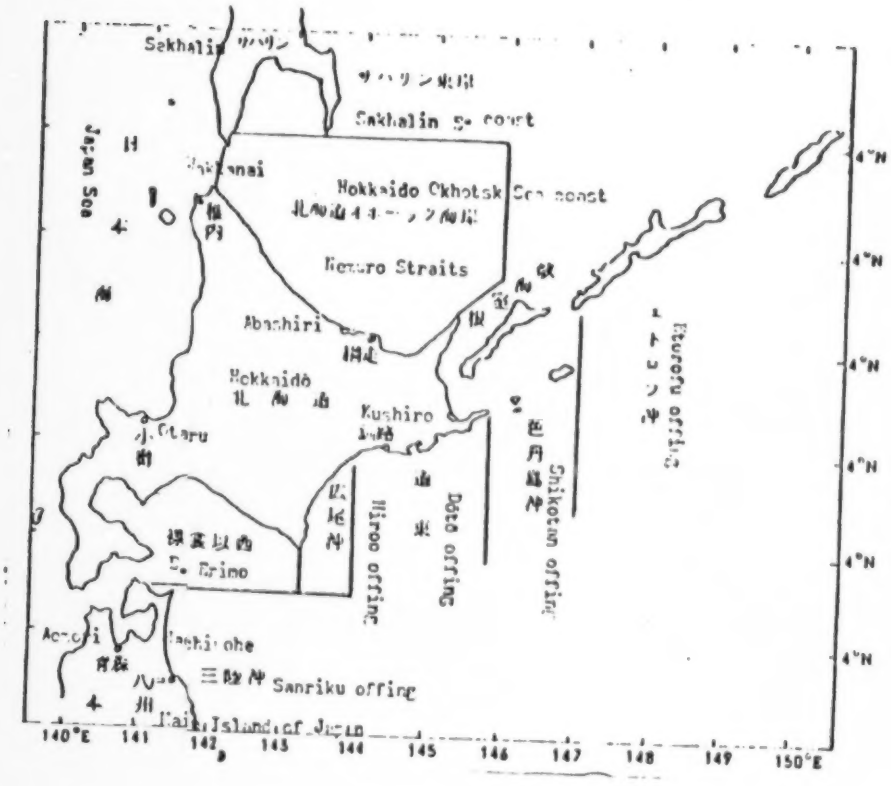

Fig. 3-4

Example of tagged fish which moved long distances

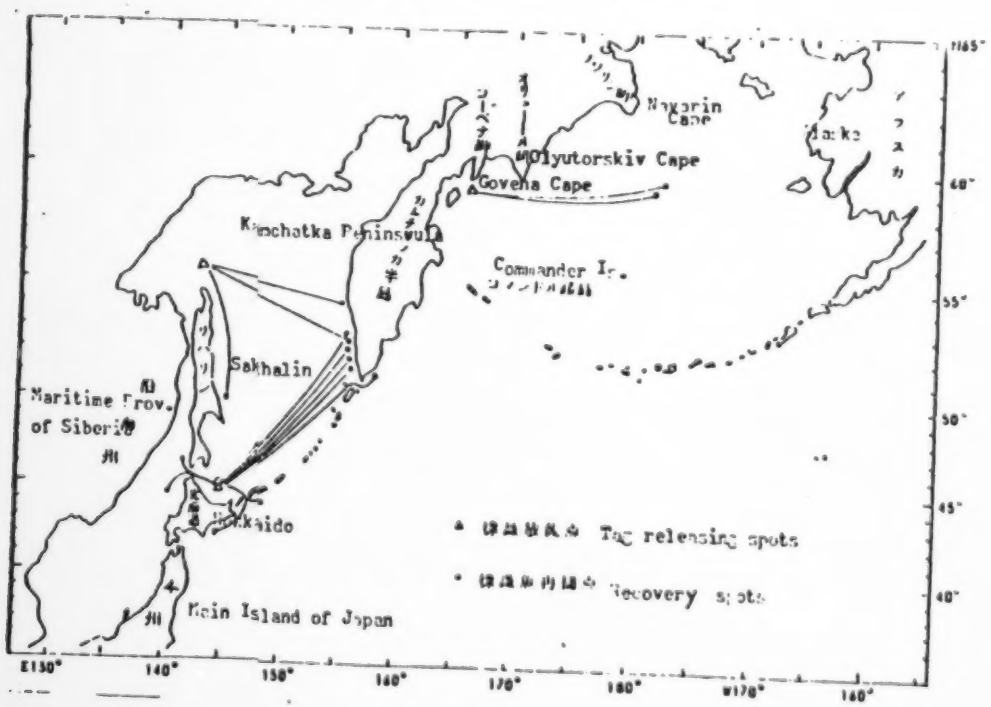

Table 3-7

Data on tag/releasing of Alaska pollock in eastern Bering Sea by Pelagic Fishery Laboratories.

Date 年月日	Ship 船名	Release location 放流位置	Fishing method 漁法	Number 尾数	Remarks 備考
June 1966. 6. 6	川汽丸	N 60° 49' W 179° 44'	手釣り	118	Disk Tag
17	Kawachimaru	N 60° 48' W 179° 48'	Hand line	80	〃
26	〃	N 60° 49' W 179° 55'	〃 fishing	24	〃
July 7. 2	〃	N 60° 46' W 179° 51'	〃	1	〃
3	〃	N 60° 46' W 179° 50'	〃	1	〃
				計 224	
July 1969. 7. 8	洋光丸	N 57° 52' W 164° 15'	手釣り	18	吹流型
9	Yōkōmaru	N 57° 29' W 164° 56'	Hand line fishing サイドトロール	134	スパゲティー 〃
〃	〃	N 57° 23' W 164° 56'	Side trawl	200	Streamer spaghetti 〃
〃	〃	N 57° 32' W 165° 29'	〃	43	〃
〃	〃	N 57° 36' W 165° 28'	〃	18	〃
〃	〃	N 57° 35' W 165° 10'	〃	33	〃
〃	〃	N 57° 28' W 165° 10'	〃	488	〃
10	〃	N 57° 26' W 163° 24'	〃	21	〃
〃	〃	N 57° 20' W 163° 37'	〃	18	〃
〃	〃	N 57° 25' W 163° 46'	〃	7	〃
〃	〃	N 57° 30' W 163° 57'	〃	878	〃
〃	〃	N 57° 36' W 163° 54'	〃	285	〃
〃	〃	N 57° 46' W 163° 44'	〃	51	〃
Aug. 8. 9	〃	N 59° 44' W 175° 85'	〃	127	〃
〃	〃	N 59° 43' W 178° 58'	〃	8	〃
〃	〃	N 59° 48' W 173° 58'	〃	202	〃
〃	〃	N 59° 36' W 178° 48'	〃	164	〃
10	〃	N 59° 18' W 173° 56'	〃	72	〃
〃	〃	N 59° 18' W 173° 03'	〃	141	〃
〃	〃	N 59° 44' W 175° 85'	〃	12	〃
〃	〃	N 59° 01' W 173° 32'	〃	116	〃
〃	〃	N 59° 18' W 174° 19'	〃	129	〃
〃	〃	N 59° 18' W 178° 19'	〃	7	〃
〃	〃	N 59° 05' W 172° 49'	〃	48	〃
11	〃	N 59° 28' W 175° 04'	〃	101	〃
〃	〃	N 59° 03' W 174° 32'	〃	120	〃
〃	〃	N 58° 49' W 174° 26'	〃	124	〃
〃	〃	N 58° 39' W 174° 47'	〃	42	〃
12	〃	N 58° 36' W 173° 48'	〃	49	〃
〃	〃	N 58° 20' W 174° 20'	〃	12	〃
〃	〃	N 58° 38' W 176° 22'	〃	6	〃
〃	〃	N 58° 14' W 174° 17'	〃	67	〃
13	〃	N 58° 38' W 176° 22'	〃	39	〃
〃	〃	N 59° 08' W 175° 41'	〃	56	〃
14	〃	N 58° 41' W 174° 52'	〃	95	内1尾1尾

1 fish recovered

Table 3-7 (continued)

年 月 日	船 名	放 流 位 置	漁 具	尾 数	備 考
Aug.					
1969. 8. 14	洋 光 丸 Yōkōmaru	N58° 40' W175° 07'	サイドトロール Side trawl	25	吹流型 スパゲティー Streamer spaghetti
〃	〃	N58° 40' W175° 04'	〃	45	〃
15	〃	N59° 42' W177° 18'	〃	84	〃
〃	〃	N59° 30' W177° 18'	〃	35	〃
16	〃	N59° 49' W178° 44'	〃	72	〃
〃	〃	N59° 49' W178° 85'	〃	36	〃
〃	〃	N59° 46' W178° 43'	〃	97	〃
18	〃	N58° 44' W177° 36'	手 釣 Hand line	6	2 fish recovered
19	〃	N58° 33' W176° 31'	〃 fishing	1,306	内 訳 8 尾
20	〃	N57° 41' W173° 50'	〃	3	吹流型 スパゲティー
21	〃	N57° 40' W174° 18'	サイドトロール	30	Streamer spaghetti
〃	〃	N57° 40' W174° 12'	Side trawl	69	〃
22	〃	N57° 08' W178° 83'	〃	42	〃
23	〃	N56° 87' W178° 00'	〃	41	〃
〃	〃	N56° 38' W178° 20'	〃	42	〃
24	〃	N56° 30' W171° 53'	〃	60	〃
〃	〃	N56° 29' W171° 49'	〃	17	〃
25	〃	N56° 11' W170° 52'	〃	50	〃
26	〃	N56° 00' W169° 49'	〃	62	〃
〃	〃	N56° 00' W169° 49'	〃	7	〃
27	〃	N55° 39' W168° 40'	〃	76	〃
〃	〃	N55° 38' W168° 44'	〃	86	〃
〃	〃	N55° 39' W168° 49'	〃	19	〃
29	〃	N55° 19' W167° 46'	〃	78	〃
				計 5,764 Total	
July					
1970. 7. 15	第 3 開 洋 丸	N58° 30' W166° 00'	サイドトロール	9	吹流型 スパゲティー
28	Inasemaru 3	N58° 15' W174° 15'	Side trawl	77	〃
〃	〃	N58° 28' W174° 19'	〃	211	Streamer spaghetti
〃	〃	N58° 33' W174° 02'	〃	261	〃
〃	〃	N58° 38' W174° 00'	〃	280	〃
〃	〃	N58° 52' W173° 55'	〃	322	〃
29	〃	N59° 25' W173° 56'	〃	363	〃
〃	〃	N59° 26' W174° 00'	〃	273	〃
〃	〃	N59° 28' W173° 47'	〃	286	〃
30	〃	N58° 24' W174° 06'	〃	203	〃
〃	〃	N58° 80' W174° 04'	〃	122	〃
Aug. 8. 2	〃	N56° 38' W165° 52'	〃	262	〃
〃	〃	N56° 38' W165° 50'	〃	288	〃
				計 2,957 Total	

Table 3-7 (continued)

年月日	船名	放流位置	漁具	尾数	備考
June 8 1971.6.8	第川丸	N56°82' W168°56'	手釣り	85	再捕2尾
18	Toshimaru	N56°28' W168°82'	Hand line	198	再捕1尾 1 fish recovered
17	〃	N56°34' W168°50'	スタントロール	469	Dick Tag
〃	〃	N56°37' W163°48'	Stanting trawl	218	
〃	〃	N56°37' W163°50'	〃	58	
〃	〃	N56°39' W163°49'	〃	337	
〃	〃	N56°40' W163°50'	〃	311	
〃	〃	N56°40' W163°49'	〃	307	
18	〃	N56°41' W163°48'	〃	192	
〃	〃	N56°40' W163°47'	〃	120	
〃	〃	N56°39' W163°47'	〃	30	
〃	〃	N56°39' W163°60'	〃	171	
〃	〃	N56°41' W163°58'	〃	148	
〃	〃	N56°42' W164°00'	〃	161	
〃	〃	N56°40' W163°58'	〃	121	
〃	〃	N56°40' W163°03'	〃	312	
〃	〃	N56°41' W164°01'	〃	182	
〃	〃	N56°41' W164°00'	〃	162	
〃	〃	N56°42' W163°58'	〃	77	
〃	〃	N56°40' W164°00'	〃	156	
				計3,817 Total	

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Table 3-8

Recovery data on Alaska Pollack in eastern Bering Sea

Tag. no. 標識番号	Release 放流 Date 年月日	Release 放流 Location 位置	Recovery 再捕 Date 年月日	Recovery 再捕 Location 位置	Nb. & length (cm) 尾叉長(cm) Rel. 放流	Nb. & length (cm) 尾叉長(cm) Rec. 再捕	Fishing method 漁具 Rel. 放流	Fishing method 漁具 Rec. 再捕
04046	Aug. 1969.8.14	N 58°41' W174°52'	1969.9.21	N 60°10' W176°00'	472	♀460	Trawl トロール	Trawl トロール
05581	Aug. 1969.8.19	N 58°33' W176°31'	1970.2.15	N 56°84' W172°45'	454	♂455	Hand line 手釣り	〃
05533	Aug. 1969.8.19	N 58°33' W176°30'	1970.5.9	N 54°43' W165°40'	500	♀400	〃	〃
05244	Aug. 1969.8.19	N 58°33' W176°31'	1971.7.22	N 56°33' W172°40'	476	♀471	〃	〃
A01297	Jun. 1971.6.13	N 56°28' W168°32'	1971.7.17	N 56°31' W172°30'	553	♀550	〃	〃
A01205	Jun. 1971.6.8	N 56°32' W163°56'	1972.3.9	N 54°37' W165°34'	353	♂375	〃	〃
A01390	Jun. 1971.6.8	N 56°32' W163°56'	1972.4.17	N 54°48' W165°37'	487	♂510	〃	〃

Table 3-9

Data on tag/releasing in the environs of the Kamchatka Peninsula, compiled by Hokkaido Fisheries Laboratory.

1. Kamchatka Peninsula

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
600	10. 7	N 54°16' E 161°04'	200	円盤 15mm Disk	トロール Trawl	若竹丸 Wakatakemaru	–	
601	10. 8	N 53°54' E 160°20'	600	•	•	•	–	
602	10. 9	N 51°05' E 157°45'	217	•	•	•	1	
603	10. 9	N 51°05' E 157°45'	860	•	釣り angling	•	9	
604	10.10	N 50°25' E 157°08'	458	•	トロール Trawl	•	–	

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
605	5.18	N 53°03' E 155°32'	77	円盤 15mm	トロール Trawl	若竹丸 Wakatakemaru	–	
606	10.27	N 50°42' E 157°15'	990	Disk or 円盤または アンカータグ anchor tag	•	•	–	
607	10.29	N 51°58' E 156°40'	1,425	•	•	•	–	

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
608	5. 7	N 58°00' E 155°56'	2	円盤 15mm Disk	釣り angling	若竹丸 Wakatakemaru	–	
609	5.20	N 56°00' E 151°00'	258	•	•	•	1	

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
610	5.15	N 50°59' E 157°27'	580	円盤 15mm Disk	釣り angling	田洲丸 Tanshūmaru	14	
611	5.18	N 51°50' E 156°49'	25	•	•	•	1	
612	5.20	N 52°37' E 155°10'	505	•	•	•	4	
613	5.23	N 58°25' E 155°07'	50	•	•	•	1	
614	5.23	N 58°52' E 155°18'	164	•	•	•	–	
615	5.25	N 54°03' E 154°55'	175	•	•	•	1	
616	5.26	N 54°25' E 155°09'	100	•	•	•	1	
617	5.27	N 55°25' E 156°05'	452	•	•	•	1	
618	5.28	N 55°56' E 155°11'	718	•	•	•	1	

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
620	5. 9	N 54°00' E 158°20'	18	円盤 15mm Disk	釣り angling	田洲丸 Tanshūmaru	–	
621	5.10	N 53°29' E 155°25'	28	•	•	•	1	
622	5.10	N 53°29' E 155°25'	962	•	特別トロール Special trawl	•	–	
623	5.12	N 51°47' E 156°00'	789	•	•	•	–	
624	5.22	N 51°05' E 157°35'	123	•	釣り angling	•	–	
625	5.23	N 50°52' E 156°45'	1,105	•	特別トロール Special trawl	•	–	

No. 番号	Date 月日	Release location 放流位置	No. released 放流数	Tag 標識札	Method of Catch 漁獲方法	Vessel 使用船舶	No. Recovered 再捕数	Remarks 備考
630	5.23	N 50°00' E 156°09'	209	円盤 15mm Disk	釣り angling	田洲丸 Tanshūmaru	–	
631	5.25	N 49°58' E 156°10'	288	•	•	•	2	
632	5.28	N 51°36' E 156°04'	871	•	•	•	1	
633	5.30	N 58°08' E 156°23'	91	•	•	•	–	
634	5.31	N 54°02' E 155°22'	112	•	•	•	–	
635	6. 1	N 54°57' E 155°08'	211	•	•	•	1	
636	6. 3	N 57°13' E 155°56'	80	•	•	•	–	
637	6. 4	N 58°14' E 156°21'	558	•	•	•	–	

Table 3-9 (continued)

2. Northern Bering Sea

No.	Date	Release location	No. released	Tag	Method of Catch	Vessel	No. Recovered	Remarks
								1970年 北水研
800	9. 2	N55°58' E 162°16'	600	円盤 10 mm Disk	釣り angling	第6興真丸 Kōhokumaru 6	–	
801	〃	〃	600	アンカータグ Anchor tag	〃	〃	–	
802	9.11	N60°52' E 178°09'	840	円盤 10 mm	〃	〃	–	
								1971年 北水研
803	10. 8	N60°28' E 170°45'	10	円盤 15 mm	釣り angling	若竹丸 Wakatake-maru	–	
804	10. 5	N59°27' E 165°46'	450	〃	トロール Trawl	〃	–	
805	10. 6	N57°06' E 168°11'	160	〃	〃	〃	–	
								1972年 北水研
810	7. 8	N59°50' E 166°54'	140	円盤 15 mm Disk	釣り angling	若竹丸 Wakatake-maru	–	
811	7.25	N62°00' W 179°00'	83	〃	〃	〃	5	
812	10.13	N58°08' E 163°36'	8	〃	〃	〃	–	
813	10.16	N59°08' E 165°32'	25	〃	〃	〃	–	
814	10.16	N59°18' E 165°22'	471	〃	トロール Trawl	〃	–	
815	10.17	N59°18' E 166°20'	663	〃	釣り angling	〃	2	
								1976年 北水研
820	7.26	N61°81' E 174°	250	円盤 15 mm Disk	釣り angling	第八興真丸 Tansbun-maru	–	
821	7.28	N61°55' E 176°06'	41	〃	〃	〃	–	

3. Northern Sea of Okhotsk

No.	Date	Release location	No. released	Tag	Method of Catch	Vessel	No. Recovered	Remarks
								1973年 北水研
700	9. 6	N52°38' E 143°48'	47	円盤 15 mm Disk	釣り angling	春雲丸 Shunyō-maru	–	
701	9. 7	N53°44' E 143°25'	9	〃	〃	〃	–	
702	9. 8	N50°40' E 144°08'	185	〃	〃	〃	–	
708	9.21	N56°37' E 142°27'	1,040	〃	〃	〃	2	
								1976年 北水研
704	9.18	N56°39' E 141°36'	2	円盤 15 mm Disk	釣り angling	北上丸 Kitakami-maru	–	
705	10. 2	N56°40' E 141°00'	117	〃	〃	〃	–	

Table 3-10 Data on release-recovery on the Okhotsk Sea coast of Hokkaido, compiled by Abashiri and Wakkanai Fisheries Research Stations.

Release conditions			Recovery conditions								( ) = No. of fish
Year	Location	Number	1970	1971	1972	1973	1974	1975	1976	1977	1978
1970	Okhotsk Deep Sea	847	W.Yamato (1)	W.Yamato (1)			Unk.(1)				
	Daishi-mashama	615	W.Yamato (1)								
	W.Yamato	2,226	E.Yamato (2)		W.Yamato (1)	Rausu (1)					
			Saibuka 1 (1)								
			Nombetsu-mae (1)								
	Oomu off-ing	441	S.Yamato (1)								
	Iisujo offing	1,333	Iisujo (1)								
	Wakkanai Iisujo	420	W.Yamato (1)								
			Oomu off-ing (1)								
	S.Yamato	25									
	Aniwa Bay	53									
	Total	5,960	10	1	1	1	1				
1971	Oomu off-ing	56									
	Nombetsu-mashama	217		W.Yamato (1)	W.Kamu * (1)		S.Yamato (1)				
				S.Yamato (1)	S.Yamato (2)						
				E. coast Sakhalin (1)							
	W.Yamato	2,519		W.Yamato (1)	W.Kamu * (1)	E.coast Sakhalin (2)	Saibuka 1 (1)	S.Yamato (1)	Iisujo (1)		
				S.Yamato (2)	S.Yamato (1)	S.Yamato (1)					
				Saibuka 1 (1)	Saibuka 1 (1)						
				E.coast Sakhalin (1)							
	S.Yamato	302		W.Yamato (3)	S.Yamato (2)		Rausu (1)				
							E.Yamato (1)				
							Oomu off-ing (1)				
	Iisujo	1,513		Saibuka 1 (1)	S.Yamato (1)	Iisujo offing (1)					
					W. coast Sakhalin (1)	E. coast Sakhalin (1)					
	Okhotsk Deep Sea 1	831		W.Yamato (2)	Saibuka 1 (1)	Iisujo off-ing (1)					
					W.Yamato (1)						

* translator's note : abbreviation for Kamtchatka ? (same hereafter)

Table 3-10 (Continued)

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Release conditions			Recovery conditions ( )- No. of fish								
Year	Location	Number	1970	1971	1972	1973	1974	1975	1976	1977	1978
1972	Iisuje offing	188		W.Yamato (1) Iisuje offing (1)	Iisuje offing (1) W.Yamato (1)						
	Esashi-asahama	899		Abashiri Bay (1) S.Yamato (3) W.Yamato (11) Nombetsu-mae (1) Saibuka 1 (2) Oomu offing (1) Unknown (1)	W.Yamato (2) Saibuka 1 (1) Muzashioka (1)	Rausu (1)					
	Total	6,525		36	18	7	6	1	1		
1972	W.Yamato	1,003			S.Yamato (4) Saibuka 1 (3) W. Yamato (6) E. coast Sakhalin (3) Iisuje offing (1)	E. Kamu (1) S.Yamato (2) Iisuje offing (1) S. Kuril Is. offing (1)	W. Yamato (1) Iisuje (1) Rausu (1)	Rausu (1) W. coast Sakhalin (1)	Saibuka 1 (1) E. coast Sakhalin (1)		
	Oomu off-ing	5,476			S. Yamato (4) W. Yamato (9) Saibuka 1 (12) Iisuje offing (3) Oomu offing (2) E. coast Sakhalin(7) Abashiri Bay (1) E. Yamato (2)	S. Yamato (2) Rausu (6) W. Yamato (1) E. coast Sakhalin(1)	S. Yamato (1) E. coast Sakhalin(1)		S.Yamato (1)		
	Okhotsk Deep Sea	316			W. Yamato (3) Saibuka 1 (3) E. Yamato (1) Rausu (1) Unknown (1)	S. Kuril Is. offing (1) Oomu offing (1) W. Yamato (1) S. Yamato (1)	W.Yamato (1)				
	Total	6,795			64	19	6	2			

Year	Location	Number	1970	1971	1972	1973	1974	1975	1976	1977	1978
1973	E. Yamato	183				W. Yamato (1)	Oomu offing (1) W. Kamu (1)				
	Okhotsk Deep Sea	365				W. Yamato (1)					
	W. Yamato	587				W. Yamato (6) E. Yamato (1) Saibuka 1 (1)	W. Yamato (1)	Saibuka 1 (1)		W. Kamu (1)	Saibuka 1 (1)
	Oomu offing	73									
	E. coast Sakhalin	4,997				Taraika (2) E. coast Sakhalin (1)					
	Total	6,185				13	3	1		1	1
1974	Okhotsk Deep Sea 1	496					E.Yamato (1) W. Yamato (1)	Rausu (2) W. Yamato (1)			
	W. Yamato	1,012					W. Yamato (5) E. Yamato (3)	W. Yamato (1) S. Yamato (1)	E.coast Sakhalin (1)	E.coast Sakhalin (1)	
	E. coast Sakhalin	4,400					E. Yamato (1)	W. Yamato (1)			
	E. Yamato	293									
	S. Yamato	85									
	Total	6,286					11	6	1	1	
1975	Oomu offing	736						W. Yamato (19) S. Yamato (2) Aniwa Bay (1) E. Yamato (2) Saibuka 1 (1) Oomu offing (1) Iisujo offing (1) Unknown (1)	W. Yamato (2) S. Yamato (4) Oomu offing (2) Rausu (1)	Nombetsu-mae (1) W. Yamato (2) Iwauchi offing (1) Rausu (1)	
	Iisujo offing	254						W. Yamato (10) Oomu offing (3) Saibuka 1 (3)	E.coast Sakhalin (1) Oomu offing (1) S.Yamato (1) Kunashiri Vic (1)		Rausu (1) W. Yamato (1)
	E. coast Sakhalin	453									
	Total	1,443						44	13	5	2
1976	N.E.coast Sakhalin	83									
	Taraika Bay	63									
	Total	146									

Table 3-11 Data on tag/releasing around Hokkaido, compiled by Hokkaido Fisheries Laboratory.

1. Southwest Okhotsk Sea

No.	Date	Release location	Nb. released	Tag	Method of Catch	Vessel	Nb. recovered	Remarks
番号	月 日	放 流 位 置	放流数	標 識 札	漁 獲 方 法	使用船舶	再捕数	備 考
							1976年 北水研	
130	6.30	N45°08' E148°14'	346	円盤 15 mm Disk	特別トロール* Special trawl	北洋丸 Tanshumaru	–	Remarks
131	7. 1	N44°59' E148°45'	109	〃	釣り Angling	〃	4	
132	7. 2	N44°59' E144°19'	183	〃	〃	〃	16	
							1976年 北水研	
133	9. 4	N46°10' E144°45'	19	円盤 15 mm Disk	釣り Angling	北辰丸 Kitashinmaru	–	
134	9. 4	N46°42' E145°17'	18	〃	トロール Trawl	〃	–	
							1977年 北水研	
135	5.21	N44°48' E144°29'	664	円盤 15 mm Disk	釣り angling	北洋丸 Tanshumaru	77	
136	5.22	N44°49' E144°28'	810	〃	〃	〃	22	
137	7. 1	N44°48' E144°21'	230	〃	〃	〃	21	
138	7. 2	N44°57' E144°18'	356	〃	〃	〃	21	
							1978年 北水研	
139	5. 6	N44°45' E146°42'	67	円盤 15 mm Disk	釣り Angling	北洋丸 Tagshumaru	–	
141	5. 7	N44°53' E144°25'	26	〃	〃	〃	–	
142	5. 8	N44°54' E144°15'	211	〃	〃	〃	1	未成魚
143	5. 9	N44°54' E144°15'	6	〃	〃	〃	–	Immature fish
144	5.10	N44°50' E144°24'	99	〃	〃	〃	6	〃
145	5.22	N44°54' E144°24'	591	〃	〃	〃	19	

* 特別トロール網は、トロールコッド・エンド内に竹で編んだ枠を入れて魚の圧力を減らすもの。

* With special trawl a bamboo basket is inserted in the cod end to reduce pressure on fish.

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from ... Translation Section

2. Sea of Japan

No.	Date	Release location	Nb. released	Tag	Method of Catch	Vessel	Nb. recovered	Remarks
番号	月 日	放 流 位 置	放流数	標 識 札	漁 獲 法	使用船舶	再捕数	備 考
							1978年 北水研	
200	5.12	N45°42' E141°10'	17	円盤 15 mm Disk	釣り Angling	北洋丸 Tanshumaru	–	Remarks
201	5.13	N45°30' E141°06'	1	〃	〃	〃	1	
202	5.17	N45°02' E140°48'	154	〃	〃	〃	–	
203	5.18	N45°56' E140°51'	423	〃	〃	〃	8	

Table 3-11 (continued)

Hokkaido Fish. Lab.
East Hokkaido Fish. Lab.

No.	Date	Release location	Nb. released	Tag	Method of Catch	Vessel	Nb. recovered 1978年 北水研	東北水研	Remarks
400	8.23 ~ 24	N 42°49' E 144°45'	106	Disk	Angling	Shunyomaru	1		
401	8.28	N 42°49' E 145°08'	56	"	"	"	--		

1977年 北水研

No.	Date	Release location	Nb. released	Tag	Method of Catch	Vessel	Nb. recovered	Remarks
410	5.23	N 43°10' E 145°45'	181	Disk 15 mm	Angling	Tanshumaru	9	
411	5.26	N 41°46' E 148°04'	489	"	"	"	--	
412	5.27	N 43°07' E 145°45'	28	"	"	"	--	
413	7.3	N 43°11' E 145°50'	419	"	"	"	12	
414	7.4	N 43°11' E 145°50'	1,159	"	"	"	50	
415	7.5	N 41°41' E 148°03'	46	"	"	"	--	
416	7.6	N 42°46' E 144°51'	175	"	"	"	5	
417	7.6	N 42°50' E 144°51'	207	"	"	"	5	

1978年 北水研

No.	Date	Release location	Nb. released	Tag	Method of Catch	Vessel	Nb. recovered	Remarks
420	4.19	N 42°22' E 141°22'	25	Disk 15 mm	Angling	Tanshumaru	1	
421	4.21	N 41°50' E 142°50'	127	"	"	"	--	
422	4.22	N 41°58' E 143°35'	445	"	"	"	--	未成魚 Immature fish
423	4.23	N 42°31' E 145°55'	8	"	"	"	--	
424	4.24	N 42°52' E 144°58'	308	"	"	"	7	
425	4.27	N 42°54' E 145°22'	5	"	"	"	--	
426	5.2	N 43°25' E 146°42'	820	"	"	"	2	
427	5.3	N 43°30' E 146°51'	15	"	"	"	--	
428	5.24	N 43°09' E 145°50'	44	"	"	"	--	

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Fig. 3-6 1970-78 Tag/Releasing-Recovery on the Okhotsk Sea coast and Japan Sea Coast of Hokkaido.

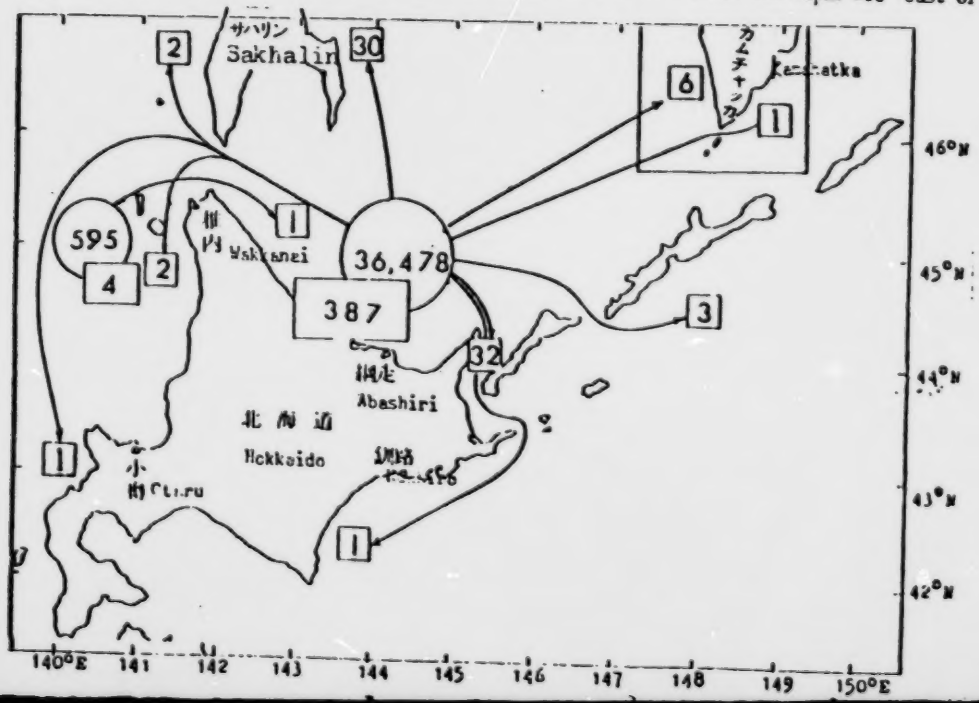

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Fig. 3-7 1977-78 Tag/Releasing-Recovery on the Pacific Ocean coast of Hokkaido

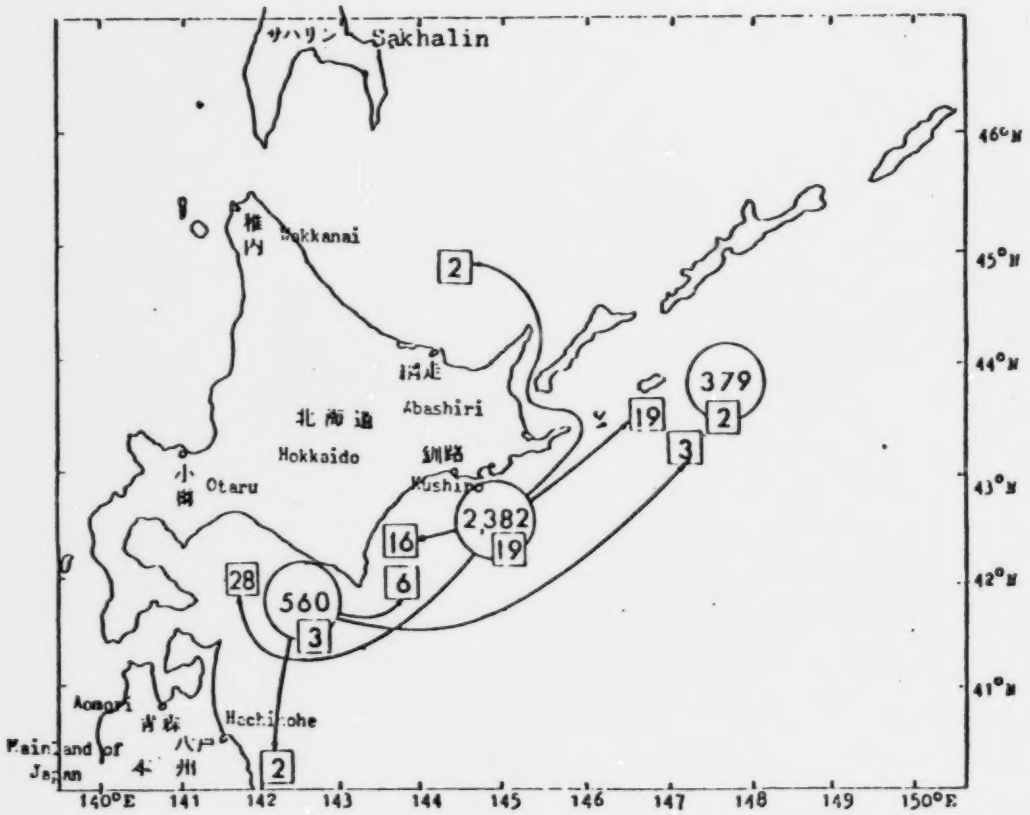

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Table 3-12 Recovery data on fish released by Hokkaido Fisheries Laboratories.

603 1971.10. 9 N51°05' E157°45' 860ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1971.11.21	42	N51°01' E157°50'			
1972. 1. 1	83	N51°19' E158°11'			
1972. 1. 2	84	N49°18' E155°25'			
1972. 1. 8	85	N51°55' E158°38'			
1972. 1. 6	452	N49°00' E154°30'			
1972. 1.28	105	N50°58' E175°00'			
1972. 1.29	111	N51°58' E158°41'			
1972. 4.11	188	N51°00' E157°48'			
1978. 1.10	457	N50°88' E157°89'			
1978. 4. 7	544	N50°12' E156°40'			
？？？		Unknown ？？？.....			

Unknown

602 1971.10. 9 N51°04' E157°38' 140ℓ トロール Trawl

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1972. 1.25	107	N53°40' E160°24'			

611 1972. 7.25 N62°00' W179°00' 88ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1972. 7.28	3	N62°15' W178°18'	480		
1972. 8. 8	9	N62°22' W178°87'	470		
1972. 7.31	6	N62°49' W178°07'			
1972. 8.15	21	N62°28' W179°00'	485		
1978. 8.21	892	N61°20' W179°10'	442		

815 1972.10.17 N59°18' E166°20' 668ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1974. 1.24	464	N59°80' W177°50'	470		
1975. 4.15	910	N59°19' W178°26'	465		

609 1978 5.20 N56°00' E151° 0' 198ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976. 3.24	1038	N54°14' E154°25'			

703 1978. 9.21 N56°37' E142°27' 478ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1974.10.23	896	ロシアチェッカリレット		440	
1977. 8. 9	1263	N54°06' E154°39'	494	408	91

*. Kamtchatka Bolcheretsk

703 1978. 9.21 N56°37' E142°53ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1974. 7.14	296	1118-1160ℓ	446	402	44

610 1974. 5.15 N50°59' E157°27' 580ℓ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.	
1976. 5. 6	721	N51°20' E158°05'	500			
1974. 6.15	31	ロシアチェッカ	425			E. Kamtchatka
1974.11. 4	178	N49°05' E154°58'	510			
1974.12. 6	205	ハルムコタン、ヒケイ	409			Haruzukotan, south.
1975. 1.15	245	N49°50' E156°28'	398			
1975. 3. 0	289	ロシアチェッカ	480			
1975. 3.18	307	N51°40' E156°00'				E. Kamtchatka
1975. 3.30	819	N49°50' E156°30'	518			
1975. 4. 3	328	N50°50' E157°52'	870			
1975. 4. 1	321	N50°40' E157°27'	478			
1975. 6. 1	382	N50°40' E157°20'	250			
1975. 8.10	299	N49°34' E155°86'	370			
1975.11.10	544	北千島、幌	420			N. Kuril Is., south
1976. 2.25	651	N53°45' E160°30'	540			
1976. 4.24	709	N51°17' E158°07'	514			
1978. 2.27	1383	北千島	444			N. Kuril Is.

Translator's note:

* Legend are listed on page 39.

** Haikara fishing: see page 6.

Table 3-12 (continued)

611 1974. 5.18 N51°50' E155°49' 25ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 2.15	273	N52°55' E154°30'	505		

612 1974. 5.20 N52°37' E155°10' 285ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1974. 6.14	24	N52°28' E155°15'			
1975. 4.10	324	N52°10' E155°04'	400		

612 1974. 5.20 N52°55' E155°10' 180ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 8. 0	1018	西カムチャッカ……	366		
1976.12. 8	881	フノイ……	366		

Unknown ヒ W. Kamtchatka

612 1974. 5.21 N52°55' E155°10' 80ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 5. 6	350	N53°21' E155°02'			

614 1974. 5.23 N53°52' E155°18' 164ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 2.11	263	N50°10' E157°30'			

615 1974. 5.25 N54°08' E154°55' 170ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 2. 5	256	N56°46' E155°16'	480		

616 1974. 5.26 N54°25' E155°09' 100ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976. 5.15	719	N55°05' E155°00'	490		
1976. 5.20	724	N53°35' E155°11'	441		
1976. 1.17	601	N55°30' E154°20'	440		

617 1974. 5.27 N55°25' E155°05' 462ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 8.11	288	N51°45' E155°30'	350		
1976. 2. 4	618	N55°…… 西カムチャッカ	380		
1976. 1.19	602	N56°08' E154°12'	420		

W. Kamtchatka

618 1974. 5.28 N55°56' E155°11' 718ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976. 6. 9	681	N53°35' E153°20'	450		
1976. 2. 0	618	N54°-56°… 西カムチャッカ			

W. Kamtchatka

621 1975. 5.10 N53°28' E155°25' 28ヒ ハイカラ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976. 8.17	810	N51°58' E158°50'	480	481	-1

631 1976. 5.25 N49°59' E156°10' 288ヒ ハイカラ

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976.11.20	179	N48°40' E155°30'	288	305	-75
1976.11.28	187	N51°50' E158°00'		285	
1976.10.21	149	N51°56' E158°25'	390	306	84

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Table 3-12 (continued)

632 1976. 5.28 N51° 86' E156° 04' 871ｷﾛ ﾍｲｾｲ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 2.25	273	ｱﾅﾄﾘｽﾀｲ.....	358	358	0
1977. 3.14	290	N51° 32' E155° 40'	356	340	16
1977. 3.26	302	N51° 57' E157° 07'	370	364	6
1976.12.30	216	N51° 14' E156° 37'		280	
1978. 1.25	607	ｴﾄﾛﾌ I. Kuril I.	372		
1978. 4.22	694	N49° 37' E155° 20'			

635 1976. 6. 1 N54° 57' E155° 08' 211ｷﾛ ﾍｲｾｲ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 1.10	223	N56° 20' E154° 20'	342	334	8

131 1975. 7. 1 N44° 59' E143° 45' 109ｷﾛ ﾍｲｾｲ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 7.30	29	67ｾﾝﾁ***ﾉｺﾘﾝ a/b	284	290	−6
1976. 5. 6	309	70ｾﾝﾁ***ﾉｺﾘﾝ "	310	280	30
1976. 5.19	322	77ｾﾝﾁﾉｺﾘﾝ "		266	
1976. 6.16	350	76ｾﾝﾁﾉｺﾘﾝ	321	292	29

132 1975. 7. 2 N44° 59' E144° 19' 188ｷﾛ ﾍｲｾｲ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1975. 7. 6	4	66ｾﾝﾁ***ﾉｺﾘﾝ a/b		472	
1975. 7. 7	5	67ｾﾝﾁ***ﾉｺﾘﾝ "	432	420	12
1975. 7. 9	7	52ｾﾝﾁ***ﾉｺﾘﾝ "	520	504	16
1975. 7.14	12	44ｾﾝﾁ***ﾉｺﾘﾝ "	445	460	−15
1975. 7.20	18	52ｾﾝﾁ***ﾉｺﾘﾝ		383	
1975. 7.12	10	67ｾﾝﾁ***ﾉｺﾘﾝ		426	
1975. 7.24	22	76ｾﾝﾁ***ﾉｺﾘﾝ	480	488	−8
1975. 7.24	22	76ｾﾝﾁ***ﾉｺﾘﾝ	472	460	12
ﾌﾞﾚｰ Unk		ﾌﾞﾚｰ Unk		426	
1976. 1.26	288	ｳﾗｽﾃｴﾊﾞ Rausu Ebeham		416	

132ﾂﾂﾞｷ cont'd

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1976. 2.28	241	ｳﾗｽﾃｴﾊﾞ Rausu Ebeham		485	
1976. 3. 2	243	N53° 04' E154° 42'		474	
1976. 3.28	269	N52° 17' E155° 06'	480	509	−29
1976. 4.22	294	77ｾﾝﾁ***ﾉｺﾘﾝ a/b	498	484	14
1976. 5.31	333	70−77ｾﾝﾁ "	440	430	10
1976. 9.22	447	73ｾﾝﾁﾉｺﾘﾝ a/b		498	
1977. 3. 2	608	ｳﾗｽﾃｴﾄｲﾙ "	480	489	−9
1976.10. 6	461	76ｾﾝﾁﾉｺﾘﾝ a/b	587	524	18
1976. 1.11	923	88ｾﾝﾁﾉｺﾘﾝ a/b	426		

** see section
b= Ministry of Agriculture & Forestry
c= 2 miles off Rausu

186 1977. 5.22 N44° 49' E144° 28' 310ｷﾛ ﾍｲｾｲ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 6.10	19	ｵﾎｰﾂｸ.....Okhotsk	347	344	3
1977. 6.12	21	66ｾﾝﾁﾉｺﾘﾝ a/b	410	414	−4
1977. 6.15	24	76.79ｾﾝﾁ..... a	337	328	9
1977. 6.15	24	76.79ｾﾝﾁ..... "		390	
1977. 6.15	24	52ｾﾝﾁﾉｺﾘﾝ a/b	351	356	−5
1977. 6.15	24	77ｾﾝﾁﾉｺﾘﾝ "	373	372	1
1977. 7. 5	44	ｵﾎｰﾂｸ.....Okhotsk	429	432	−3
1977. 7.10	49	67ｾﾝﾁﾉｺﾘﾝ a/b	402	402	0
1977. 6.28	37	43−44ｾﾝﾁ "		342	
1977. 7. 1	40	75ｾﾝﾁﾉｺﾘﾝ a/b		380	
1977. 7. 9	48	75ｾﾝﾁﾉｺﾘﾝ "	324	324	0
1977. 7.16	54	77ｾﾝﾁﾉｺﾘﾝ "		357	
1977. 7.25	64	79ｾﾝﾁﾉｺﾘﾝ "	375	376	−1
1977.10. 9	140	73ｾﾝﾁﾉｺﾘﾝ "	483	476	7
1977. 8.24	94	70ｾﾝﾁﾉｺﾘﾝ "	380	370	10
1977. 7. 2	41	ﾌｲﾝｽｷｲ Unk/Kitami offing		338	
1977.12.24	216	N44° 30' E143° 30'		356	
1978. 3.28	305	ｳﾗｽﾃ41.1ｲﾙ Almi Rausu	428	413	15
1978. 6.14	386	76ｾﾝﾁﾉｺﾘﾝ a/b	456	456	0
1976. 7. 2	406	52ｾﾝﾁﾉｺﾘﾝ "	480	412	68
1976. 7.15	419	13213ﾉｺﾘﾝ "	495	480	15
1976. 8. 9	444	76ｾﾝﾁﾉｺﾘﾝ "	407	356	44

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Table 3-12 (continued)

135 1977. 5.21 N44°48' E144°29' 664m **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH RETURN	BODY LENGTH RELEASED	MM DIF.
1977. 5.29	8	N45°04' E144°00'	357	360	-3
1977. 5.30	9	N44°42' E143°50'		328	
1977. 5.30	9	77カイクノクリン a/b	354	356	-2
1977. 5.30	9	N44°30' E143°50'		360	
1977. 6. 5	15	N44°20' E144°05'	339	340	-1
1977. 6. 5	15	N44°58' E142°49'	390	388	2
1977. 6. 6	16	N45°10' E143°40'	378	376	0
1977. 6. 6	16	N44°27' E144°07'	334	332	2
1977. 6. 7	17	N45°10' E143°50'	365	372	-7
1977. 6.10	20	66カイクノクリン a/b	405	400	5
1977. 6.12	22	44カイクノクリン.	373	372	1
1977. 6.12	22	66カイクノクリン.		392	
1977. 6.12	22	52カイクノクリン.	447	374	73
1977. 6.15	25	52カイクノクリン. "		422	
1977. 6.15	25	70カイクノクリン. "		384	
1977. 6.15	25	76カイクノクリン. "	358	355	3
1977. 6.15	25	76カイクノクリン. "	360	357	3
1977. 6.17	27	66カイクノクリン.		350	
1977. 6.17	27	66カイクノクリン. a/b	398	390	8
1977. 6.25	35	61カイクノクリン.		298	
1977. 6.26	36	67カイクノクリン.	372	370	2
1977. 6.19	29	N45°06' E143°50'	332	346	-14
1977. 6.25	35	52カイクノクリン.	350	353	-3
1977. 6.25	35	52カイクノクリン.	400	402	-2
1977. 6.25	35	52カイクノクリン.	336	337	-1
1977. 6.28	38	66カイクノクリン.	382	374	8
1977. 6.29	39	69カイクノクリン.		348	
1977. 6. 0	10	オホーツク.....Okhotsk	370	365	5
1977. 6.29	39	44カイクノクリン a/b	384	363	21
1977. 6.30	40	N45°10' E143°	370	376	-6
1977. 6.28	38	オホーツク.....Okhotsk	340	336	
1977. 7. 1	41	66カイクノクリン a/b	423	414	
1977. 7. 5	45	オホーツク.....Okhotsk	381	386	-5
1977. 6.27	37	61-62カイク..... a		459	
1977. 6.28	38	43-44カイク..... "		372	
1977. 6.27	37	54カイクノクリン. a/b		387	
1977. 6.27	37	61-62カイク..... a		404	
1977. 7. 1	41	86カイクノクリン. a/b		387	
1977. 7. 6	46	75-76カイク..... a	373	373	0
1977. 7. 6	46	75-76カイク..... "		342	

135 ** cont'd

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH RETURN	BODY LENGTH RELESED	MM DIF.
1977. 7. 9	49	67カイクノクリン a/b	418	419	-1
1977. 7. 9	49	キタミオキ Kitami offing		443	
1977. 7.10	50	76カイクノクリン a/b		392	
1977. 7.10	50	76カイクノクリン.	526	524	2
1977. 7.10	50	76カイクノクリン. "	449	447	2
1977. 7.10	50	67カイクノクリン.		334	
1977. 7.16	56	76カイクノクリン.	464	467	-3
1977. 7.28	68	44°48' E144°21'	845	845	0
1977. 8.12	83	ウナシリオキ Kunashir		422	
1977. 9. 1	103	76カイリノクリン a/b	395	385	10
1977. 9. 8	110	75カイクノクリン.		376	
1977. 9.20	122	79カイクノクリン.		320	
1977 9.26	128	79カイクノクリン. "	428	426	-3
1977.10. 9	141	78カイクノクリン.	485	472	13
1977.10.14	146	73カイクノクリン.	385	392	-7
1977.10.14	146	73カイクノクリン.	341	332	9
1977.10.12	144	ラウスマッポウオキ Rausu Kappo offin		376	
1977. 6.29	39	76カイクノクリン a/b	388	382	6
1977. 6.30	40	51カイクノクリン. "	459	444	15
1977. 8.22	93	76カイクノクリン. "	350	352	-2
1977. 7. 2	42	Unk/Kitami offing ワイノオキ	452	450	2
1977.12.11	204	58カイクノクリン a/b	363	366	-3
1977.12.19	212	アバシリNE8マイル d	355	352	3
1978. 1.16	240	トカプコクE180° Tokatsu	49	465	
1978. 1.16	240	32カイクノクリン a/b	460	464	-4
1977. 6.30	40	97カイクノクリン. "	459	444	15
1978. 1. 6	230	12カイクノクリン. "		422	
1978. 3. 4	287	ラウスマイハマ Rausu Maihama		480	
1978. 3. 3	286	シリトンベツ1.8K e	390	370	20
1978. 4.26	340	62カイクノクリン a/b	404	386	18
1978. 5.27	371	ラウスマイハマ Rausu Maihama		390	
1978. 5.30	374	ラウスマイハマ "		472	
1978. 6. 4	379	59カイクノクリン a/b	384	367	17
1978. 6.16	391	45カイクノクリン a/b	468	468	0
1977. 7.13	53	ワイ Unknown		361	
1978. 7.13	418	67カイクノクリン a/b	474	476	-2
1978. 8.17	453	N64° 02' E143°47'	355	322	33

T 3-12 (continued)

137 1977. 7. 1 N44°48' E144°21' 230ｋｍ ﾏｲﾅｽ Taikara **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 7. 5	4	ﾌｲｯｼｬﾘｰｽ Unk/Kitami offing	340	330	10
1977. 7. 6	5	ﾌｲｯｼｬﾘｰｽ "	865	868	-3
1977. 7. 6	5	ﾌｲｯｼｬﾘｰｽ "	311	319	-8
1977. 7. 9	8	67ｶｲﾘｮｳ "		384	
1977. 7. 4	8	67.75ｶｲﾘｮｳ "	284	280	4
1977. 7. 4	8	79ｶｲﾘｮｳ "	316	308	8
1977. 7.10	9	67ｶｲﾘｮｳ "	328	334	-6
1977. 7. 7	6	ﾌｲｯｼｬﾘｰｽ Unk/Kitami		360	
1977. 7.21	20	ﾌｲｯｼｬﾘｰｽ "		288	
1977. 7.28	27	N44°48' E144°21'	848	848	0
1977. 7.20	19	76ｶｲﾘｮｳ "		405	
1977. 7.20	19	76ｶｲﾘｮｳ "	300	294	6
1977. 7.25	24	ﾌｲｯｼｬﾘｰｽ Unk/Kitami		356	
1977. 8.31	61	76ｶｲﾘｮｳ "	349	344	5
1977. 9.16	77	72ｶｲﾘｮｳ "	864	359	5
1977. 9.26	87	79ｶｲﾘｮｳ "	310	298	12
1977. 9.24	85	79ｶｲﾘｮｳ "		402	
1977.11.27	149	ｳﾗｽｶｶｲｽｲ f		318	
1978. 1.19	202	ｳﾗｽ/DEP200M Rausu	470	453	17
1978. 6.12	346	70ｶｲﾘｮｳﾉｳﾘﾝ a/b		326	
1978. 9.20	446	N43°16' E146°30'		329	

138 1977. 7. 2 N44°57' E144°18' 356ｋｍ ﾏｲﾅｽ ** cont'd

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 7. 7	5	ﾌｲｯｼｬﾘｰｽ Unk/Kitami offing	409	420	-11
1977. 7. 7	5	82.87ｶｲﾘｮｳ "	467	466	1
1977. 7. 8	6	66ｶｲﾘｮｳ "		378	
1977. 7. 9	7	67ｶｲﾘｮｳ "	887	894	-7
1977. 7.10	8	76ｶｲﾘｮｳ "	385	373	12
1977. 7.10	8	Unk/Kitami offing		366	
1977. 7.18	16	63ｶｲﾘｮｳ "	295	298	-3
1977. 7.14	12	79OR75ｶｲﾘｮｳ "	436	429	7
1977. 7.21	19	76ｶｲﾘｮｳ "	417	421	-4
1977. 9. 1	61	78ｶｲﾘｮｳ "	440	433	7
1977. 9. 6	66	76ｶｲﾘｮｳ "	432	443	-11
1977. 8.25	54	ｳﾗｽｶｰｿﾗｲﾜｽﾚ f	442	456	-14
1977. 9.23	83	76ｶｲﾘｮｳ "		395	
1977.10. 4	94	869ｶｲﾘｮｳ "	528	514	9

142 1978. 5. 8 N44°54' E144°15' 211ｋｍ ﾏｲﾅｽ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978.11. 6	182	72ｶｲﾘｮｳﾉｳﾘﾝ a/b		207	

144 1978. 5.10 N44°50' E144°24' 99ｋｍ ﾏｲﾅｽ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 6.12	33	67ｶｲﾘｮｳﾉｳﾘﾝ a/b	368	354	14
1978. 6.17	38	67ｶｲﾘｮｳﾉｳﾘﾝ		415	
1978. 6.25	46	1321ｶｲﾘｮｳﾉｳﾘﾝ		394	
1978. 6.25	46	68ｶｲﾘｮｳﾉｳﾘﾝ "	407	404	3
1978. 7. 4	55	910ｶｲﾘｮｳﾉｳﾘﾝ "	464	461	3
1978. 8.22	104	76ｶｲﾘｮｳﾉｳﾘﾝ		420	

200 1978. 5.12 N45°42' E141°10' 17ｋｍ ﾏｲﾅｽ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 5.30	18	45ｶｲﾘｮｳﾉｳﾘﾝ a/b	430	446	-16

201 1978. 5.13 N45°30' E141°06' 1ｋｍ ﾏｲﾅｽ **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 7.18	61	ｶｲﾊﾄｳｽﾚ Kaibato	offing		

203 1976. 5.15 N44°58' E140°51' 423ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 5.24	6	ﾘﾝﾓﾝﾜﾝﾎﾞﾝﾏｷ i		350	
1976. 5.24	6	N45°10'E141°12'	342	350	-8
1976. 9.18	128	372ｻｲﾉｶﾜﾗﾝ a/b	344	310	34

145 1978. 5.23 N44°51' E144°24' 581ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 6. 6	14	45ｻｲﾉｶﾜﾗﾝ a/b	440	428	12
1978. 6. 7	15	60ｻｲﾉｶﾜﾗﾝ "	442	449	-7
1976. 6.30	36	910ｻｲﾉｶﾜﾗﾝ "	377	401	-24
1976. 7.11	49	N47°40' E145°00'		395	
1976. 7.11	49	N47°40' E145°00'	374	362	12
1978. 7.14	52	59ｻｲﾉｶﾜﾗﾝ a/b	392	390	2
1978. 7.16	54	73ｻｲﾉｶﾜﾗﾝ "	496	513	-17
1978. 7.10	48	70ｻｲﾉｶﾜﾗﾝ "	422	420	2
1978. 7.12	50	76ｻｲﾉｶﾜﾗﾝ "	386	400	-14
1976. 8.25	2	65ｻｲﾉｶﾜﾗﾝ	448	452	9
1978. 7.26	64	68ｻｲﾉｶﾜﾗﾝ "	445	440	5
1978. 8. 2	71	65ｻｲﾉｶﾜﾗﾝ "	418	416	2
1978. 8. 4	73	66ｻｲﾉｶﾜﾗﾝ	434	444	-10
1976. 8. 4	73	79ｻｲﾉｶﾜﾗﾝ	448	450	-2
1976. 8.14	114	ﾊﾔﾄﾏｷ Litomi offing		374	
1978. 7.17	55	N43°08' E144°00		488	

410 1977. 5.28 N43°10' E145°45' 181ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 9.26	126	ﾚｺﾀﾝｿﾏ Shikotan off	444	446	-2
1977. 8.19	88	ﾚｺﾀﾝｿﾏ "	456	426	30
1977.12. 9	200	ｼﾗﾇｶ S14.8M Shiranuka	424	430	-6
1977.12.13	204	ｼﾗﾇｶ 180°18M	500	490	10
1978. 3. 5	286	ｴﾘﾓｿﾏ Erimo offing		412	
1976. 1.31	253	ｴﾘﾓｿﾏ " Hobori-	420	428	-8
1978. 2.19	272	ﾉｻﾘﾍﾌﾟ 180°7M betsu	408	414	-6
1976. 3. 5	286	ｴﾘﾓｿﾏ Erimo offing		412	
1976. 5.15	357	ﾑﾛﾗﾝﾌﾟﾏ	430	422	8
1976.10. 1	496	N43°08' E146°01'	460	420	40

Kiritappu offing

411 1977. 5.26 N41°46' E143°04' 489ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 9. 2	99	N42°16' E146°28'	429	419	10
1977. 5.27	124	N41°47' E142°44'	412	415	-3
1977.12. 8	196	ﾉｻﾘﾍﾌﾟﾉﾝ SWBM Noboribetsu	885	882	8
1977.12. 5	193	ｷﾘﾛﾛﾏｷ 12ｻｲﾏｷ j	40	370	
1977.12.28	216	ﾊﾔﾄﾏｷﾏﾂﾏｷ k	460	462	-2
1978. 1. 0	219	ﾄﾏｺﾛﾏｷ Tokatsu Harbor		322	
1976. 3.15	293	N36°42' E141°56'		428	
1976. 5.31	309	ｴﾘﾓﾏｷ Erimo offing	520	513	7
1976. 6.19	389	N38°32' E141°56'	402	390	12
1978. 8. 1	432	561ｻｲﾉｶﾜﾗﾝ a/b	440	433	7
1978. 5.16	447	N43°98' E146°02'		391	
1976. 9. 7	469	N41°37' E142°48'		382	

413 1977. 7. 3 N43°1,' E145°50' 350ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 8. 7	34	570ｻｲﾉ a	425	430	-5
1977. 8.22	49	561ｻｲﾉ "	460	452	7
1977. 9. 2	60	N43°16' E146°28'	421	424	-3
1977. 9. 2	60	ﾚｺﾀﾝｿﾏ Shikotan off	346	355	-9
1978. 1. 9	189	ﾄﾏｺﾏｲｺﾂ280° j	472	454	18
1977.12.29	176	ﾄﾏｺﾏｲｺﾂ280° k	406	431	-25
1978. 1.18	198	ﾉﾎﾞﾘﾍﾂﾏｷ Noboribetsu	405	416	-11
1978. 2.25	236	N41°45' E143°43 offing		428	
1978. 8. 7	246	ﾄｳﾄﾂﾏｷ Dōtō offing	402	336	6
1978. 8.28	267	ﾋﾛｽ85°28ﾏｲﾙ	438	445	-7
1978. 8. 0	239	ｱﾌﾟｸﾏ 28 mls. Hirop		441	
1978. 8.10	402	ﾉｰﾍﾞﾙﾌﾟﾏｷ Noberpu offing	442	451	-9

416 1977. 7. 6 N42°46' E144°51' 138ε ﾏｶﾚﾚ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977.12. 0	146	ﾌﾒｲ Unk		374	
1978. 3.11	247	N41°45' E143°42'		295	

Table 3-17 (continued)

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977. 8.10	87	シコタンランラン 18M	426	421	5
1977. 8.10	87	シコタンランラン "	332	333	-1
1977. 8.18	45	シコタンオホ Shikotan offing		427	
1977. 8.21	48	シコタンオホ "		406	
1977. 8.22	49	N43°19' E146°32'	429	484	-55
1977. 8.22	49	561カイリ 8	412	411	1
1977. 8.23	50	N43°25' E146°43'		432	
1977. 8.30	57	シコタンオホ Shikotan offing	394	401	-7
1977. 9. 5	63	シコタンオホ "	430	434	-4
1977. 9. 9	67	N43°31' E146°56'	448	445	3
1977. 9.24	82	79カイリ 8		461	
1977. 9.24	82	79カイリ "		450	
1977.10. 6	94	クシロ170°16マイル16	mls Kushiro	464	
1977.10.30	118	キリタップオホ Kiritappu offing			
1977.11. 2	121	140カイリ 8		458	
1977. 7.12	8	N43°08' E145°55'		444	
1977.12. 4	153	サハラオホ5マイル5	ris Sahara offing	422	
1977.12. 5	154	ノボリベツ1.5M	Noboribetsu	446	
ラ イ ン Unk		ライン Unk		448	
1977.12 9	158	ホロベツオホ 2M	412	406	6
ラ イ ン		182カイリノクリ a/b Horobetsu offing		464	
1977.12.15	164	182カイリ・クリル a/b	444	444	0
1978. 1.17	197	N42°54' E145°31'	466	469	-3
1978. 1. 7	187	ムロランオホ8マイル n	450	428	22
1977.12.16	165	ノボリベツE ノN12M	Nobori-	430	428	2
1977.12.28	177	ノボリベツオホ "	betsu	430	406	24
1977.12.21	170	182カイリノクリ a/b	410	415	-5
1977.12.27	176	シラオイホコストオホ o	500	455	45
1977.12.28	177	ハムナナSSW8マイル p	885	897	-12
1977.12.29	178	トマコマイコク230° Tomakomai harbor	448	444	4
1978. 1.18	198	トマコマE180° "	Tomakomai harbor	482	
1978. 1.17	197	ノボリベツオホ	Noboribetsu	422	426	-4
1978.12.28	177	181カイリノクリ a/b	406	403	3
1978. 1.30	210	ノボリベツSSE7M	Noboribetsu	430		
1978. 2.20	231	ハナサキオホ	Hanasaki offing	436		
1978. 1.28	208	キリコマNE14マイル	Mori harbor	460	435	25
1978. 2 1	212	ウラカワSW8.5M	Urakawa	275	273	2
1978. 2 11	222	ノボリベツオホ	Noboribetsu offing	418		
1978. 2.24	235	ウラカワオホ	Urakawa offing	426		
1978. 2 7	218	トマハラオホ	Tomihara offing	550	515	35

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 2. 9	220	アツカオホ SW9M	Atsuka	435	440	-5
1978. 2.17	228	ハイランコウS 8M	Hainchi	472	480	-8
1978. 2.17	228	アツカオホ SWC .5M	Atsuka	460	456	4
1978. 3.12	251	トロオマイハラ 9	Atsuka	417	424	-7
1978. 3.16	255	N42°51' E145°31'		391	386	5
1978. 4.14	284	N42°50' E142°25'			508	
1978. 1.10	196	N38°00' E128°30'		47	435	
1978. 4.13	283	コンブウハラオホ	Konbuhara	470	474	-4
1978. 5. 8	426	ハナサキSE12マイル	Honesaki	444	432	12
1978. 9.21	444	108カイリノクリ a/b		456	410	46

416 1977. 7. 6 N42°42' E144°51' 87マイル **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
ラ イ ン Unk		ライン Unk		451	454	-3
1977.12.28	174	ハボマイシオマオホ k		404	461	-57
1978. 3.14	250	シラオオホ	Shioya offing	490	482	36

417 1977. 7. 6 N42°50' E144°51' 207マイル **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1977.12.25	171	シラオDEP250M	Shioya	405	401	4
1977.12.23	169	シラオDEP70M	Shiraoi	390	381	9
1978. 1.19	196	トロイワイハラ r		440	436	4
1978. 2.25	238	N41°36' E143°40'		452	450	2
1978. 3.20	266	トロマイハラ r		511	479	32

420 1978. 4.19 N42°22' E141°22' 28マイル **

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 9. 9	143	エサンオホ14マイル	14 mls off Esashi	68	580	

Table 3-12 (continued)

424 1978. 4.24 N42°52' E1144°52' 208 ﾋﾞ ﾒｽ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGHT IN MM RETURN	RELEASED	DIF.
1978. 5. 8	5	ｷﾘﾀｯﾌﾟ Kiritappu	♂466	467	-1
1978. 5.28	28	ﾊﾅｻｷ Hanasaki offing	426	444	-18
1978. 5.16	22	ｷﾘﾀｯﾌﾟ Kiritappu	♂484	496	-12
1978. 5.14	20	ｷﾘﾀｯﾌﾟ "	♀399	392	7
1978. 8.13	111	N43°08' E146°08' "		456	
1978. 8.17	115	N43°11' E146°10'		418	
1978.10.21	180	ﾄﾖ Toyo offing		360	

426 1978. 8. 2 N43°24' EL146°40' 320 ﾋﾞ ﾒｽ**

DATE RECAPTURED	PERIOD DAY	LOCATION RECAPTURED	BODY LENGTH IN MM RETURN	RELEASED	DIF.
1978. 9.14	135	N43°02' E145°47'	352	344	8
1978.10. 4	155	N43°09' E146°04'	378	372	6

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Legend:

a= Sea section
b= Ministry of Agriculture & Forestry
c= 2 miles off Rausu
d= 8 miles N.E. of Abeshiri
e= Shiritanbetsu
f= Rausu Nakanose offing
g= Rausu Rōsokuiwa offing
h= 2 miles off Rausu Point
i= Rishirisenpōshi offing
j= Hori Harbour offing
k= Haginoishiyama offing
l= Tomakomai Harbour
m= S. tip of Shikotan
n= Kuroran offing
O= Shiraoiyokosuto offing
p= 8 miles SSW of Harutate
q= Hiroo Maihama
r= Horomitsu maihama